SDM-HS94/HS94P

SERVICE MANUAL

US Model
Canadian Model
AEP Model
Chinese Model

TFT LCD COLOR COMPUTER DISPLAY

SONY®

HS94

Model name	Colour	Main destination	AUO	FUJITSU
SDM-HS94	BLACK	AEP	1,260,001-1,330,000	1,330,001-1,400,000
SDM-HS94	BLUE	AEP	3,700,001-3,800,000	3,800,001-3,900,000
SDM-HS94	BLACK	CH	9,960,001-9,965,000	9,965,001-9,970,000

HS94P

Model name	Colour	Main destination	AUO	LPL
SDM-HS94P	BLACK	AEP	1,260,001-1,400,000	–
SDM-HS94P	SILVER	AEP	6,200,001-6,400,000	–
SDM-HS94P	BLACK	U/C	9,940,001-9,960,000	6,500,001-6,550,000
SDM-HS94P	SILVER	U/C	6,000,001-6,200,000	6,550,001-6,600,000
SDM-HS94P	SILVER	CH	6,600,001-6,630,000	–

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SPECIFICATIONS

1. LCD CHARACTERISTICS

[HS94]

Type	: TFT Color LCD Module
Active Display Area	: 19 inch(376.32(H) x 301.056(V))
Size	: 404.2(W) x 330(H) x 20(D)
Pixel Pitch	: 0.294 (Per one triad) x 0.294
Color Depth	: 16,777,216 colors
Electrical Interface	: LVDS
Operating Mode	: Normally White
Backlight Unit	: 4-CCFL (Cold Cathode Fluorescent Lamp)

[HS94P]

Type	: TFT Color LCD Module
Active Display Area	: 19 inch(376.32(H) x 301.056(V))
Size	: 396(W) x 324(H) x 18(D)
Pixel Pitch	: 0.294 (Per one triad) x 0.294
Color Depth	: 262K colors
Electrical Interface	: LVDS
Operating Mode	: Normally White
Backlight Unit	: 4-CCFL (Cold Cathode Fluorescent Lamp)

2. OPTICAL CHARACTERISTICS

2-1. Viewing Angle by Contrast Ratio ≥ 10

[HS94] Left : -85° min Right : +85° min
Top :+85° min Bottom : -85°min

[HS94P] Left : -65° min Right : +65° min
Top :+65° min Bottom : -65°min

2-2. Luminance

[HS94] : 200(min), 250(Typ)
[HS94P] : 350(min), 400(Typ)

2-3. Contrast Ratio

[HS94] : 400(min), 700(Typ)
[HS94P] : 250(min), 450(Typ)

3. SIGNAL (Refer to the Timing Chart)

3-1. Sync Signal

• Type : Separate Sync

3-2. Video Input Signal

1) Type : R, G, B Analog
2) Voltage Level : 0~0.70 V(±5%)
a) Color 0, 0 : 0 Vp-p
b) Color 7, 0 : 0.35 Vp-p
c) Color 15, 0 : 0.7 Vp-p
3) Input Impedance : 75Ω

3-3. Operating Frequency

Horizontal : 28 ~ 80kHz
Vertical : 48 ~ 75Hz

4. Max. Resolution

Analog : 1280 x 1024 / 75Hz
Digital : 1280 x 1024 / 60Hz

5. POWER SUPPLY

5-1. Power : AC 100~240V, 50/60Hz , 1.0A

5-2. Power Consumption

MODE	H/V SYNC	VIDEO	POWER CONSUMPTION	LED COLOR
POWER ON (NORMAL)	ON/ON	ACTIVE	less than 50 W	GREEN
STAND-BY	OFF/ON	OFF	less than 1 W	AMBER
SUSPEND	ON/OFF	OFF	less than 1 W	AMBER
DPMS OFF	OFF/OFF	OFF	less than 1 W	AMBER
POWER S/W OFF	-	-	less than 1 W	OFF

6. ENVIRONMENT

6-1. Operating Temperature: 5°C~35°C (41°F~95°F) (Ambient)
6-2. Relative Humidity : 10%~80% (Non-condensing)
6-3. MTBF : 50,000 Hours(Typ) 30,000 Hours(Min)

7. DIMENSIONS (with TILT/SWIVEL)

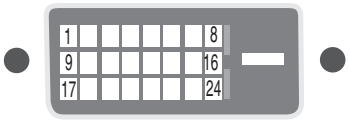
Width : 480 mm (18.9")
Depth : 260 mm (10.2")
Height : 440mm (17.3")

8. WEIGHT (with TILT/SWIVEL)

Net. Weight : 7.1 kg (15.65 lbs)
Gross Weight : 9.4 kg (20.72 lbs)

Signal Connector Pin Assignment

• DVI-D Connector



Pin	Signal (DVI-D)	Pin	Signal (DVI-D)
1	T. M. D. S. Data2-	16	Hot Plug Detect
2	T. M. D. S. Data2+	17	T. M. D. S. Data0-
3	T. M. D. S. Data2/4 Shield	18	T. M. D. S. Data0+
4	T. M. D. S. Data4-	19	T. M. D. S. Data0/5 Shield
5	T. M. D. S. Data4+	20	T. M. D. S. Data5-
6	DDC Clock	21	T. M. D. S. Data5+
7	DDC Data	22	T. M. D. S. Clock Shield
8	Analog Vertical Sync.	23	T. M. D. S. Clock+
9	T. M. D. S. Data1-	24	T. M. D. S. Clock-
10	T. M. D. S. Data1+		
11	T. M. D. S. Data1/3 Shield		
12	T. M. D. S. Data3-		
13	T. M. D. S. Data3+		
14	+5V Power		
15	Ground (return for +5V, H. Sync. and V. Sync.)		

T. M. D. S. (Transition Minimized Differential Signaling)

PRECAUTION

WARNING FOR THE SAFETY-RELATED COMPONENT.

- There are some special components used in LCD monitor that are important for safety. ***These parts are marked ⚠ on the schematic diagram and the replacement parts list.*** It is essential that these critical parts should be replaced with the manufacturer's specified parts to prevent electric shock, fire or other hazard.
- Do not modify original design without obtaining written permission from manufacturer or you will void the original parts and labor guarantee.

TAKE CARE DURING HANDLING THE LCD MODULE WITH BACKLIGHT UNIT.

- Must mount the module using mounting holes arranged in four corners.
- Do not press on the panel, edge of the frame strongly or electric shock as this will result in damage to the screen.
- Do not scratch or press on the panel with any sharp objects, such as pencil or pen as this may result in damage to the panel.
- Protect the module from the ESD as it may damage the electronic circuit (C-MOS).
- Make certain that treatment person's body are grounded through wrist band.
- Do not leave the module in high temperature and in areas of high humidity for a long time.
- The module not be exposed to the direct sunlight.
- Avoid contact with water as it may a short circuit within the module.
- If the surface of panel become dirty, please wipe it off with a softmaterial. (Cleaning with a dirty or rough cloth may damage the panel.)

⚠ CAUTION

Please use only a plastic screwdriver to protect yourself from shock hazard during service operation.

⚠ WARNING

BE CAREFUL ELECTRIC SHOCK !

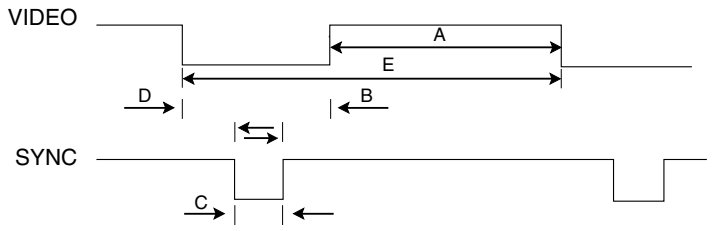
- If you want to replace with the new backlight (CCFL) or inverter circuit, must disconnect the AC adapter because high voltage appears at inverter circuit about 650Vrms.
- Handle with care wires or connectors of the inverter circuit. If the wires are pressed cause short and may burn or take fire.

TIMING CHART

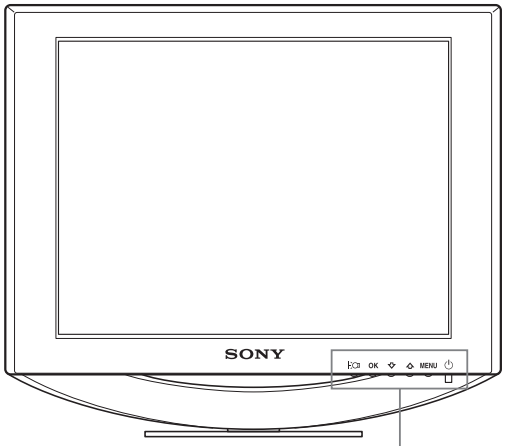
<< Dot Clock **(MHz),** Horizontal Frequency **(kHz)**, Vertical Frequency **(Hz)**, Horizontal etc... **(μs)**, Vertical etc... **(ms)** >>

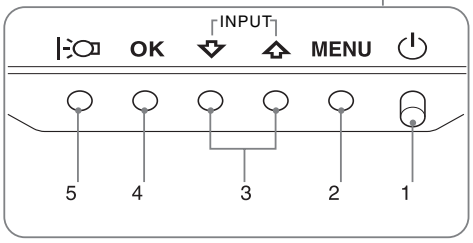
Mode	H/V Sort	Sync Polarity	Dot Clock	Frequency	Total Period (E)	Video Active Time (A)	Front Porch (C)	Sync Duration (D)	Back Porch (F)	Blanking time (B)	Resolution
1	H	–	28.350	31.500	900	720	18	108	54	180	**720x400**
	V	+		70.156Hz	449	400	12	3	34	49	**70Hz**
2	H	–	25.175	31.469	800	640	16	96	48	160	**640x480**
	V	–		59.940Hz	525	480	10	2	33	45	**60Hz**
3	H	–	30.240	35.00	864	640	64	64	96	224	**640x480**
	V	–		66.667Hz	525	480	3	3	39	45	**65Hz**
4	H	–	31.500	37.50	840	640	16	64	120	200	**640x480**
	V	–		75.0Hz	500	480	1	3	16	20	**75Hz**
5	H	–	31.505	35.162	896	720	34	40	102	176	**720x480**
	V	–		59.901Hz	587	480	12	2	93	107	**60Hz**
6	H	+-	36.000	35.156	1024	800	24	72	128	224	**800x600**
	V	+		56.250Hz	625	600	1	2	22	25	**56Hz**
7	H	+	40.000	37.879	1056	800	40	128	88	256	**800x600**
	V	+		60.317Hz	628	600	1	4	23	28	**60Hz**
8	H	+	50.000	48.077	1040	800	56	120	64	240	**800x600**
	V	+		72.188Hz	666	600	37	6	23	66	**72Hz**
9	H	+	49.500	46.875	1056	800	16	80	160	256	**800x600**
	V	+		75.0Hz	625	600	1	3	21	25	**75Hz**
10	H	–	57.285	49.727	1152	832	32	64	224	320	**832x624** **(MAC16")**
	V	–		74.553Hz	667	624	3	3	37	43	**75Hz**
11	H	–	65.000	48.363	1344	1024	24	136	160	320	**1024x768**
	V	–		60.004Hz	806	768	3	6	29	38	**60Hz**
12	H	–	75.000	56.476	1328	1024	24	136	144	304	**1024x768**
	V	–		70.069Hz	806	768	3	6	29	38	**70Hz**
13	H	+	78.750	60.023	1312	1024	16	96	176	288	**1024x768**
	V	+		75.029Hz	800	768	1	3	28	32	**75Hz**
14	H	–	80.000	60.241	1328	1024	32	96	176	304	**1024x768** **(MAC19)**
	V	–		74.927Hz	804	768	3	3	30	36	**75Hz**
15	H	+	108.000	67.500	1600	1152	64	128	256	448	**1152x864**
	V	+		75.000Hz	900	864	1	3	32	36	**75Hz**
16	H	–	100.000	68.681	1456	1152	32	128	144	304	**1152x870** **(MAC21)**
	V	–		75.062Hz	915	870	3	3	39	45	**75Hz**
17	H	–	92.940	61.795	1504	1152	30	128	194	352	**1152x900**
	V	–		65.950Hz	937	900	2	4	31	37	**66Hz**
18	H	–	105.590	71.732	1472	1152	16	96	208	320	**1152x900**
	V	–		76.068Hz	943	900	2	8	33	43	**75Hz**
19	H	+	46.200	31.216	1480	1170	37	129	144	310	**1170x584**
	V	+		50.026Hz	624	584	3	3	34	40	**50Hz**
20	H	+	108.000	60.000	1800	1280	96	112	312	520	**1280x960**
	V	+		60.000Hz	1000	960	1	3	36	40	**60Hz**
21	H	+	108.000	63.981	1688	1280	48	112	248	408	**1280x1024**
	V	+		60.020Hz	1066	1024	1	3	38	42	**60Hz**
22	H	+	135.000	79.976	1688	1280	16	144	248	408	**1280x1024**
	V	+		75.025Hz	1066	1024	1	3	38	42	**75Hz**

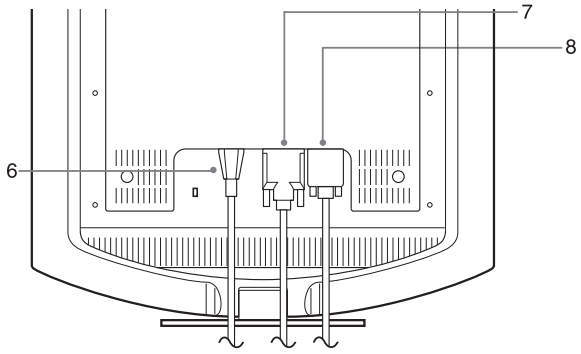
TIMING CHART



OPERATING INSTRUCTIONS







1. ⏻ (Power) switch and indicator
To turn the display on or off, press the ⏻ (power) switch upward.
The power indicator lights up in green when the display is turned on, and lights up in orange when the monitor is in power saving mode.

2. MENU button
This button displays or closes the main menu.

3. ↑/↓ buttons
These buttons function as the ↑/↓ buttons when selecting the menu items and making adjustments.

4. OK button
This button selects the item or executes the settings in the menu.

5. ☼ button
This button is used to change the brightness of the screen.

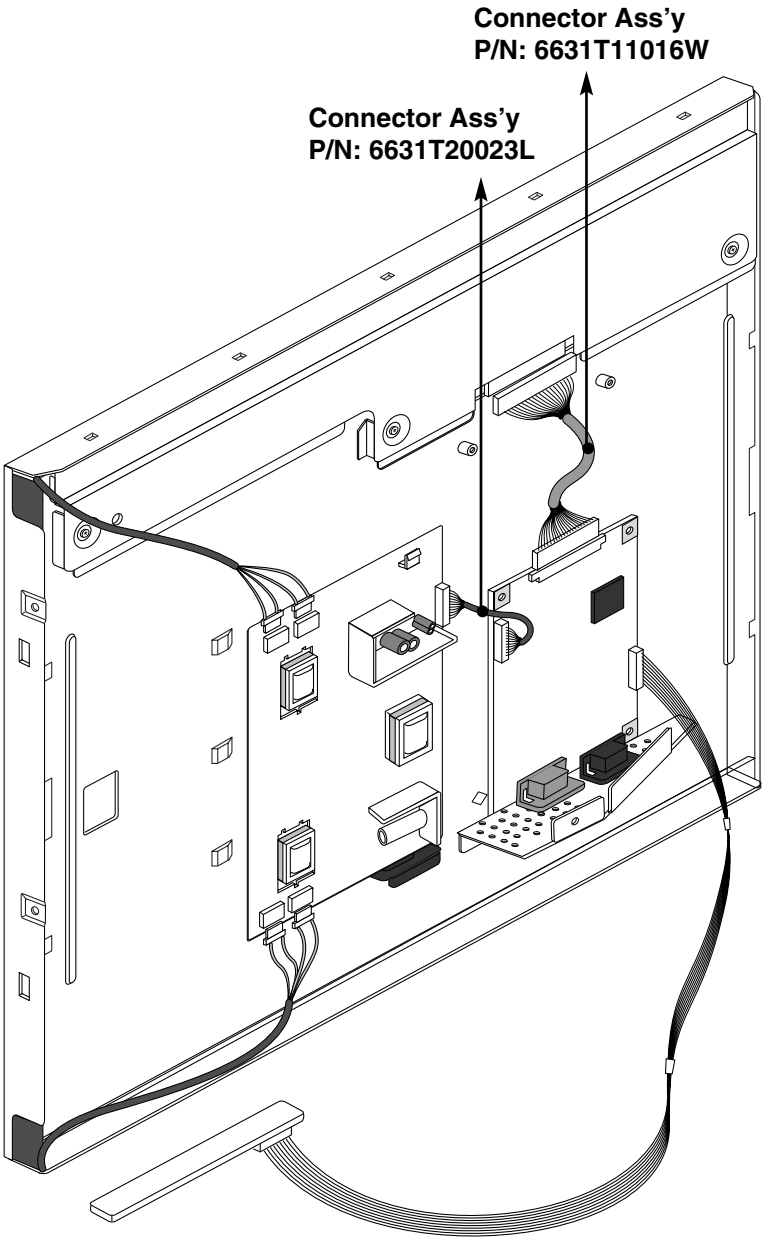
6. AC IN connector
Connect the power cord (supplied).

7. DVI-D input connector (digital RGB)
This connector inputs digital RGB video signals that comply with DVI Rev.1.0.

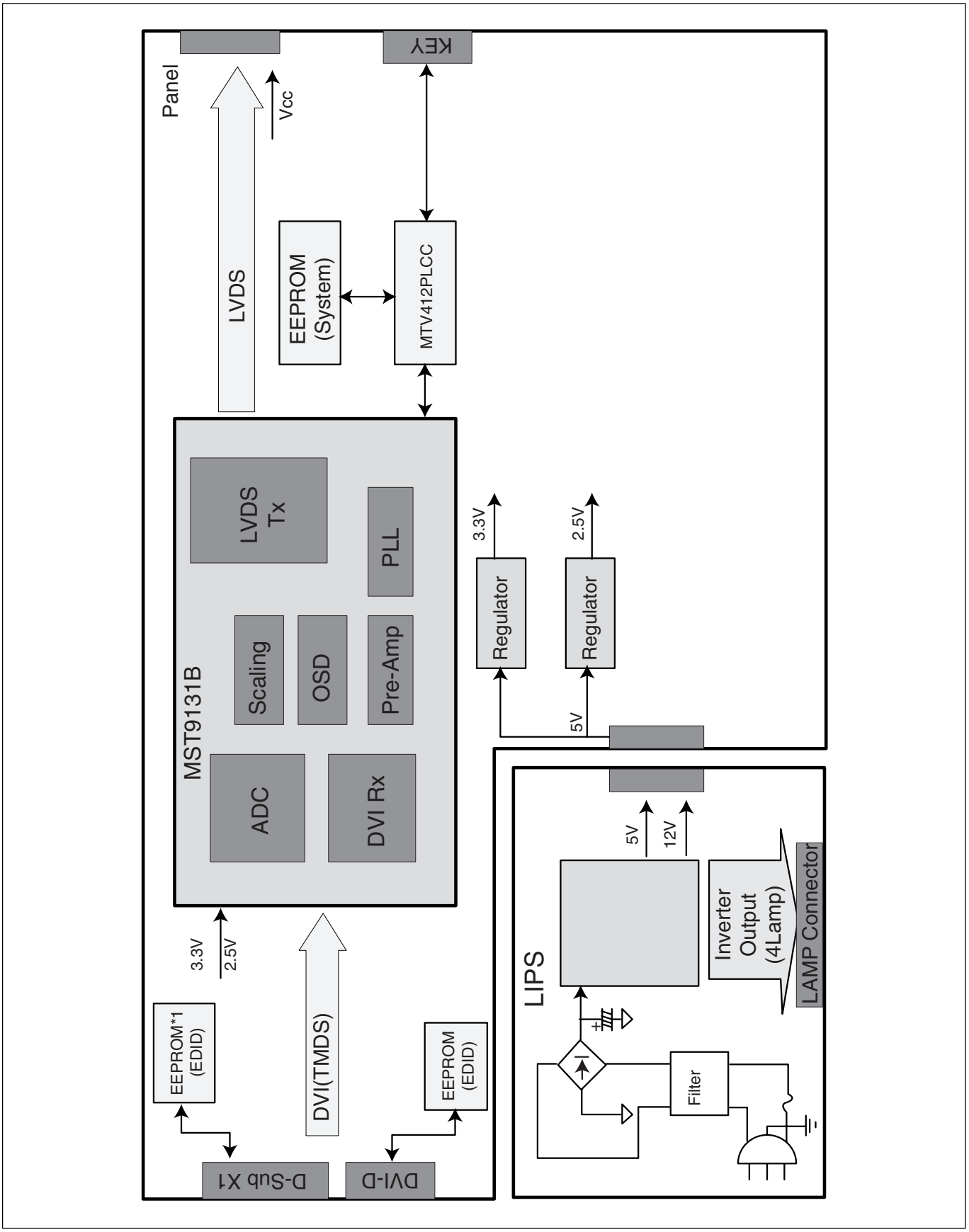
8. HD15 (RGB) input connector (analog RGB)
This connector inputs analog RGB video signals (0.7 Vp-p, positive) and SYNC signals. DDC (Display Data Channel) is a standard of VESA.

9. Input Select

WIRING DIAGRAM



BLOCK DIAGRAM



DESCRIPTION OF BLOCK DIAGRAM

1. Video Controller Part & Display Data Transmitter Part.

This part amplifies the level of video signal for the digital conversion and converts from the analog video signal to the digital video signal using a pixel clock.
The pixel clock for each mode is generated by the PLL.
The range of the pixel clock is from 25MHz to 135MHz.
This part consists of the Scaler, LVDS Tx, TMDS Rx, Reset IC.
The Scaler gets the video signals which were converted analog to digital, interpolates input to 1280 x 1024 resolution signal and outputs 8-bit R, G, B signal to transmitter.
Especially pre-amp / ADC / Video controller/ Transmitter are merged to one chip 'MST9131A' by MST.
This part transmit digital signal from the Scaler to the receiver of module.

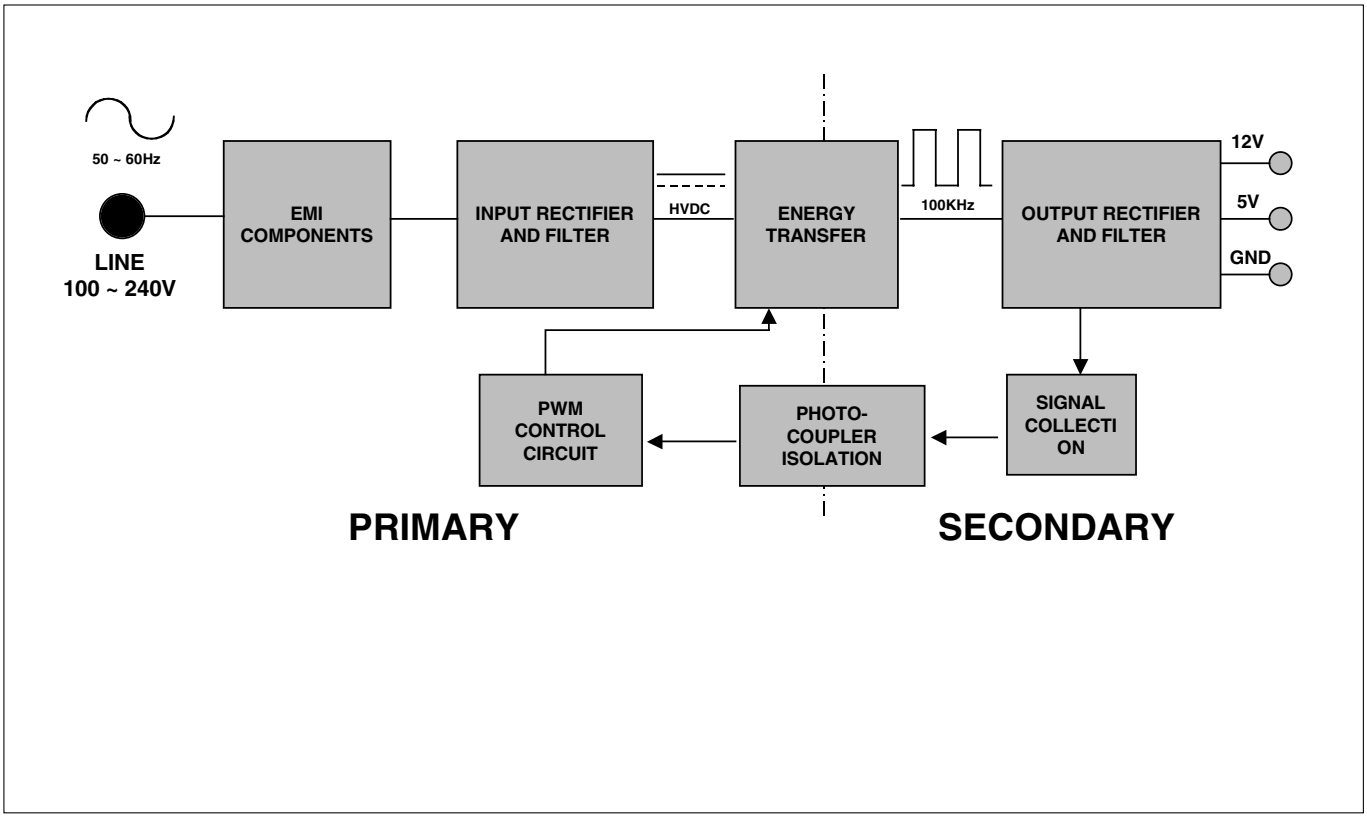
2. Power Part

This part consists of the one 3.3V and one 2.5 regulators to convert power which is provided 5V by LIPS Board.
In particular, 5V is provided for LCD Panel. There is also 12V which is for Audio power.
Also, 5V is converted 3.3V and 2.5V by regulator. Converted power is provided for IC in the main board.

3. System Controller (Microprocessor) Circuit

1) Microprocessor (U501) distinguishes polarity and frequency by calculating horizontal and vertical sync input from signal source.
2) Microprocessor (U501) carries out power control by sending power-down trigger signal to each IC.
3) Microprocessor (U501) communicates with EEPROM (704), and MST9131A (U201) through IIC or 8 bit bus line. It is enable to control and communicate each devices.
4) Microprocessor (U501) let User adjust screen by OSD function.

LIPS Board Block Diagram



Operation description_LIPS

1. EMI components.

This part contains of EMI components to comply with global marketing EMI standards like FCC, VCCI CISPR, the circuit included a line-filter, across line capacitor and of course the primary protection fuse.

2. Input rectifier and filter.

This part function is for transfer the input AC voltage to a DC voltage through a bridge rectifier and a bulk capacitor.

3. Energy Transfer.

This part function is transfer the primary energy to secondary through a power transformer.

4. Output rectifier and filter.

This part function is to make a pulse width modulation control and to provide the driver signal to power switch, to adjust the duty cycle during different AC input and output loading condition to achive the dc output stablize, and also the over power protection is also monitor by this part.

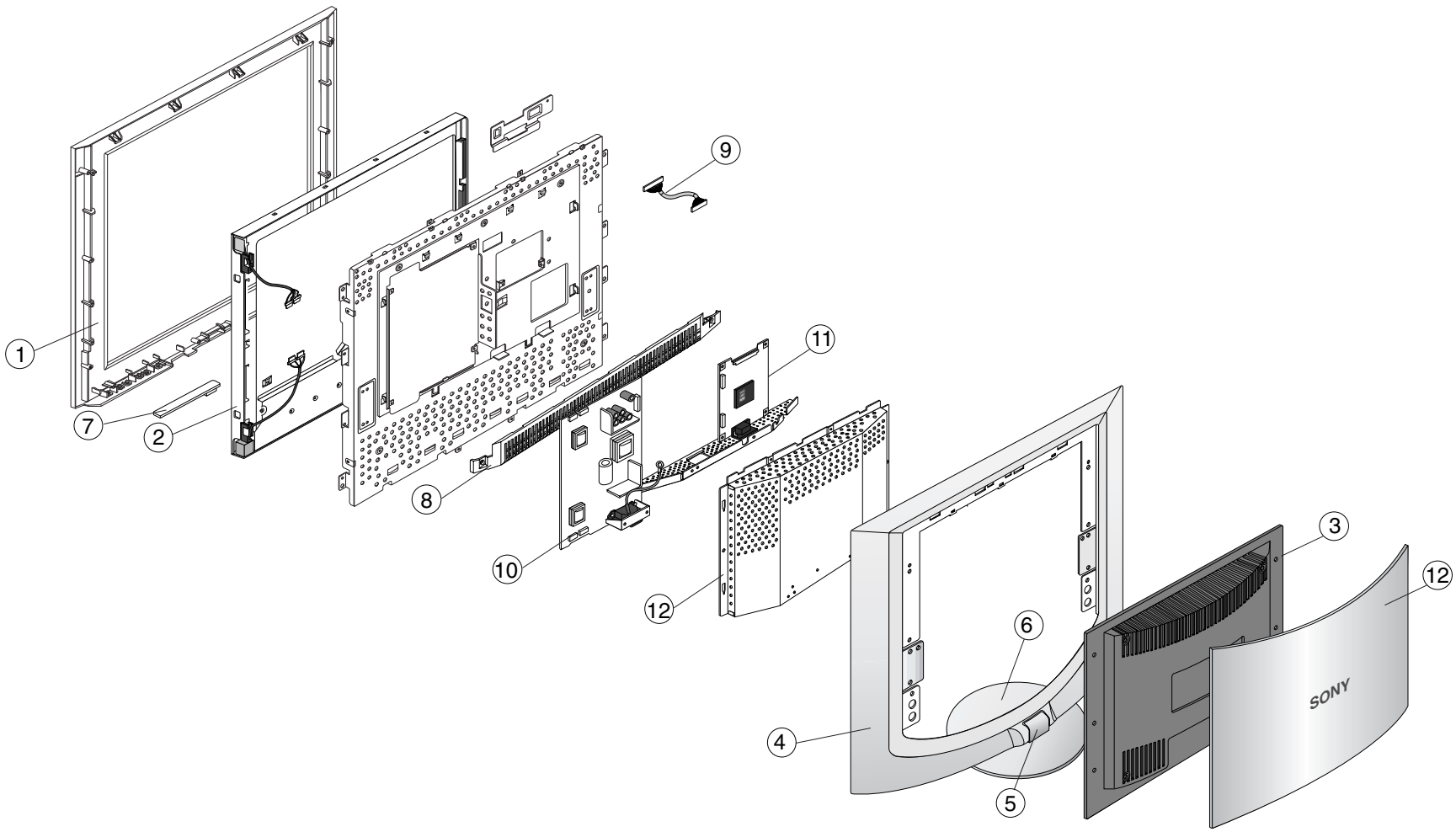
5. Photo-Coupler isolation.

This part function is to feed back the dc output changing status through a photo transistor to primary controller to achieve the stabilized dc output voltage.

6. Signal collection.

This part function is to collect the any change from the dc output and feed back to the primary through photo transistor.

EXPLODED VIEW



LGE HS94 EXPLODED VIEW PARTS LIST

Ref. No.	Part No.	Description
1	X-2022-696-1	BEZEL ASSY (Black)
	X-2022-718-1	BEZEL ASSY (Blue)
2	1-805-347-21	Panel: FLC48SXC8V-11A (Fujitsu)
	1-805-644-11	Panel: M190EN02-V2 (AUO)
3	X-2022-697-1	BACK CABINET ASSY (Black)
	X-2022-721-1	BACK CABINET ASSY (Blue)
4	X-4041-491-1	CENTER CABINET ASSY
5	4-094-676-01	HINGE COVER
6	X-4041-492-1	STAND ASSY
7	A-1066-954-A	H MOUNT
8	4-094-671-31	BOTTOM VENT COVER (Black)
	4-094-671-21	BOTTOM VENT COVER (Blue)
9	1-900-275-71	Connector Assy (Common)
10	A-1070-059-A	G MOUNT: Powernet (Fujitsu)
		G MOUNT: SPI (Fujitsu)
	A-1070-062-A	G MOUNT: Powernet (AUO)
		G MOUNT: SPI (AUO)
11	A-1070-060-A	A MOUNT (Main board) (Fujitsu)
	A-1070-063-A	A MOUNT (Main board) (AU)
12	2-149-425-01	REAR COVER (Black)
	2-149-425-31	REAR COVER (Blue)
13	2-588-353-01	Bracket, Panel (with Fujitsu Panel)
ACCESSORIES & PACKING MATERIALS		
14	1-827-110-21	D-SUB CABLE
15	1-829-852-11	DVI CABLE
16	1-827-120-21	POWER-SUPPLY CORD SET (AEP)
	1-827-122-21	POWER-SUPPLY CORD SET (CH)
17	2-148-303-01	CD-ROM
18	2-103-460-11	QUICK SETUP GUIDE (CH)
	2-103-460-01	QUICK SETUP GUIDE (AEP)
19	4-094-401-01	PROTECTION BAG
20	2-149-428-01	CUSHION
21	2-148-719-01	INDIVIDUAL CARTON

LGE HS94P EXPLODED VIEW PARTS LIST

Ref. No.	Part No.	Description
1	X-2022-698-1	BEZEL ASSY (Black)
	X-2022-719-1	BEZEL ASSY (Silver)
2	1-805-751-11	Panel: M190EN04-V1 (AUO)
	1-805-818-11	Panel: LM190E03-A4K1 (LPL)
3	X-2022-697-1	BACK CABINET ASSY
4	X-2022-700-1	CENTER CABINET ASSY
5	4-094-676-31	HINGE COVER
6	X-2022-701-1	STAND ASSY
7	A-1066-954-A	H MOUNT
8	4-094-671-31	BOTTOM VENT COVER
9	1-900-275-71	Connector Assy
10	A-1070-062-A	G MOUNT: Powernet (AUO)
		G MOUNT: SPI (AUO)
	A-1105-653-A	G MOUNT: Powernet (LPL)
		G MOUNT: SPI (LPL)
11	A-1070-077-A	A MOUNT (Main board) (AUO/LPL)
12	2-149-425-11	REAR COVER (Black)
	2-149-425-41	REAR COVER (Silver)
ACCESSORIES & PACKING MATERIALS		
13	1-827-757-11	D-SUB CABLE
14	1-827-758-11	DVI CABLE
15	1-827-118-11	POWER-SUPPLY CORD SET (U/C)
	1-827-120-11	POWER-SUPPLY CORD SET (AEP)
	1-827-122-11	POWER-SUPPLY CORD SET (CH)
16	2-148-303-01	CD-ROM
17	2-103-460-11	QUICK SETUP GUIDE (U/C, CH)
	2-103-460-01	QUICK SETUP GUIDE (AEP)
18	4-094-401-01	PROTECTION BAG
19	2-149-428-01	CUSHION
20	2-148-721-01	INDIVIDUAL CARTON